

Articulating Solar Panel Energy System (ASPEN), Phase I

Completed Technology Project (2018 - 2019)



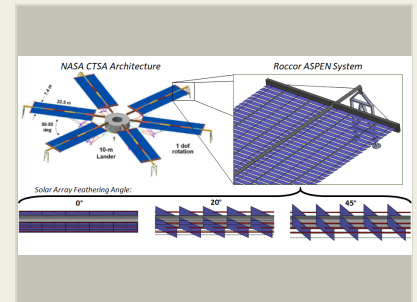
Project Introduction

In response to NASA's need for a compact, low-cost and autonomous deployable solar array system to support Martian surface exploration, Roccor proposes to enhance the Mars Compact Telescoping Surface Array (CTSA) baseline design by incorporating an Articulating Solar Panel Energy System (ASPEN). The Mars CTSA was established in 2017 as the culmination of an extensive trade performed at NASA's Langley Research Center with the goal to support human Mars exploration. The ASPEN system includes PV cells bonded to a thin membrane that is z-folded while stowed, and pulled out / tensioned when deployed. The ASPEN system replaces traditional membrane PV blankets with lightweight panels that can be articulated in unison much like "Venetian blinds". This presence of articulation and resulting gaps between substrates offer unique advantages for operation on the Martian surface: 1) reduced cell density leading to increased performance in cost, W/kg and kW/m^3 , 2) implementation of array porosity and articulation control to reduce interaction with Martian wind and mitigate dust collection, and 3) modular design that enables mass production and ease of replacement.

Anticipated Benefits

The ASPEN technology is directly related to the ongoing development effort at the NASA Langley Research Center on the Mars Compact Telescoping Surface Array (CTSA) in support of human exploration of Mars. This effort will offer potential enhancements that will improve the baseline mission architecture.

The ASPEN technology enables rapid solar array pointing offering protection to harsh environments such as weather, debris or undesired electromagnetic radiation / directed energy. As such, this work is applicable to solar arrays deployed in harsh environments by both commercial and government defense agencies.



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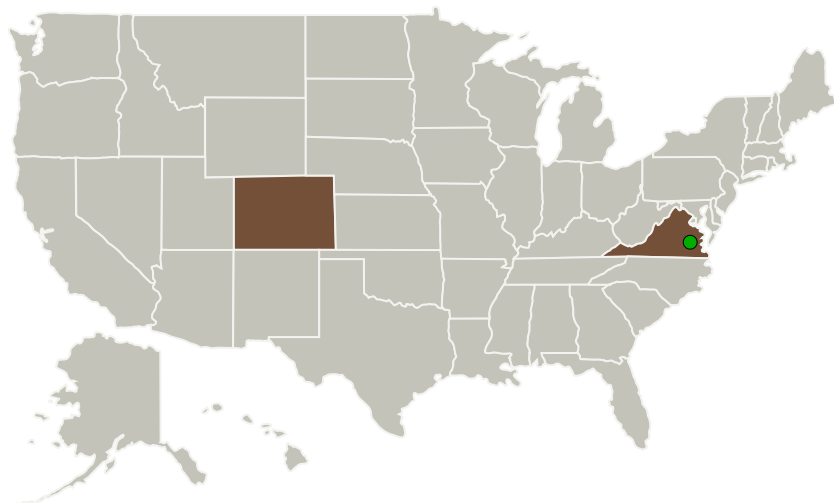
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Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---------------------------------|-------------------------|-------------|--------------------|
| Roccor, LLC | Lead Organization | Industry | Longmont, Colorado |
| ● Langley Research Center(LaRC) | Supporting Organization | NASA Center | Hampton, Virginia |

Primary U.S. Work Locations

| | |
|----------|----------|
| Colorado | Virginia |
|----------|----------|

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140934>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Roccor, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dana Turse

Co-Investigator:

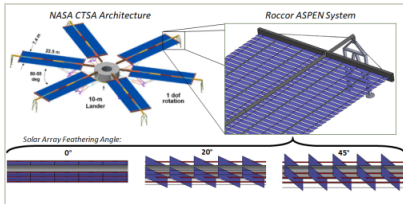
Dana Turse

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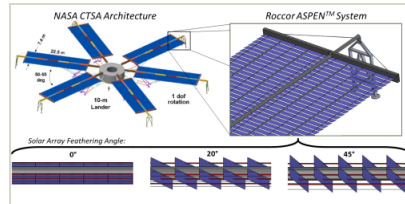
Images



Briefing Chart Image

Articulating Solar Panel Energy System (ASPEN), Phase I

(<https://techport.nasa.gov/image/128267>)



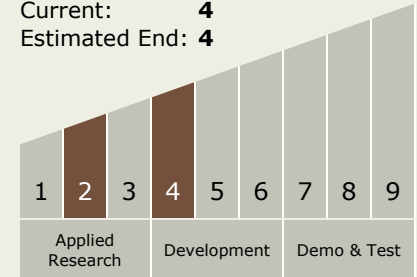
Final Summary Chart Image

Articulating Solar Panel Energy System (ASPEN), Phase I

(<https://techport.nasa.gov/image/128269>)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.3 Mechanical Systems
 - TX12.3.1 Deployables, Docking, and Interfaces

Target Destination

Mars